Building Value with Building Science:
High Performance Green Building in the Housing Industry

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Green building concerns environmentalists, planners, and builders alike. The energy efficiency of a building—its "performance"—can add real and perceived value to a property. Tight construction, attention to the "building envelope,"and proper ventilation can make a home less expensive to operate and thus more attractive to the consumer. The Energy Star program, similar to LEED, sets the standard for designing and implementing these high performance, energy efficient buildings. Planners and developers can assist in this process by setting the stage for a future of greener home-building practices.

In relation to the housing industry, the term "green" may mean many things: solar panels, recyclable decking, locally harvested lumber, etc. While all of these products could be considered green, it is important to remember that green comes in more than one shade. A new shade of green has hit the market recently—building performance. Much like the measurement of embodied energy in a specific product, building performance looks at the big picture, the total effectiveness of the whole building.

Principles of Building Performance

Whether dealing with an existing home or building new, the basic principles of home performance are the same. The goal is to create a living environment that is healthy, efficient, durable, and comfortable. Building scientists across the nation agree that the most influential element of "comfort" for a building occupant is the radiant surface temperature of the surfaces inside the building. For example, in a room that has a poorly insulated cathedral ceiling, the temperature of the ceiling (the sheetrock) may, in the summer, reach in excess of 120 degrees, causing it to act as a radiant heater for the rest of the room. Regardless of how much air-conditioning is pushed into this room, it will never feel comfortable—because there is a huge radiant heater overhead, constantly heating the space and the homeowner. The key is to create a building envelope that "maintains" the comfort. The HVAC system controls the temperature and relative humidity of the air, while the building envelope maintains it.

The Building Envelope

There are two elements to the building envelope, the air barrier and the insulation. Both must be properly installed in order for the envelope to function as intended. The air barrier refers to the layer of the wall that creates the "pressure boundary" that separates the inside of the building from the outside of the building. The air barrier

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must be continuous. Buildings with serious air barrier issues will lead to high utility bills, polluted indoor air, moisture introduction into the wall assembly, and uncomfortable living environments. The other component of the building envelope is the insulation and the proper installation of the insulation. The insulation must be installed so that it is in contact with the sheetrock in all locations in order to perform as intended.

A high performance, energy efficient home is inherently tightly constructed. A tight building envelope is what keeps the conditioned air inside the envelope and keeps the pollutants out of the living space. The idealistic goal, in regards to efficiency, is to have a home that is 100 percent air tight, preventing random air movement throughout the house (drafts) while also leading to lower utility bills.

Fresh-Air Introduction for Healthy Living Environments

Fresh air ventilation will soon be mandated by code. So, home builders have begun incorporating green building and high performance building to protect their clients early. Another form of ventilation mandated by code is the foundation vent. Foundation vents have historically been included in building codes to allow moisture that originates from the ground (under the house) to escape through holes in the foundation. But, the U.S. Department of Energy (DOE) and building scientists across the nation now agree that vented crawlspaces are not a good idea. With a properly sealed crawlspace, vents are not needed, and in most cases, they introduce more moisture than they remove.

Most builders consider the crawlspace to be "outside" of the building envelope. But, the crawlspace should be considered part of the living environment. A healthy crawlspace should be well sealed in order to protect the building's durability, indoor air quality, and energy efficiency (to review scientific studies on sealed crawlspaces, visit www.crawlspaces.org).

Affecting the "Perceived Value" of Housing

The ability to sell the concepts of efficiency, healthy indoor air quality, and building durability (resistance to mold/moisture) has become a necessity in order for builders to keep up with competition, to protect or build a reputation, and ensure client satisfaction. This differentiation is an important aspect of being successful in the industry. As the housing industry is being taken over by huge corporate builders, the only way for the not-so-large builder to stay in business is to differentiate, to add value to what they do.

By incorporating building science into their homebuilding process, builders have been able to dramatically improve their public image, reduce their operating costs (reducing call-backs), and increase customer satisfaction by providing homes that cost homeowners less to operate, have superior indoor air quality, and are more comfortable.

Energy Star: A High Performance Building Program

The program with the most recognition from local Home Builders Associations is the EPA's Energy Star program. The Energy Star program is designed to guarantee a high performance home to the end user through a simple process that, when implemented correctly, will allow builders to seamlessly integrate these new steps into their existing building process. Houses built to these standards are being demanded by buyers and embraced by progressive builders and developers who wish to provide superior housing to deserving clients and differentiate their companies from the competition. This homebuilding program requires that every qualified home meet strict guidelines for home performance and be verified as such by a third party. The third party also analyzes the plans before construction begins, trains the builder and trades-people, identifies potential problems during the construction of the home, and tests the house using a variety of high-tech diagnostic tools. With this

third-party knowledge and support, buyers recognize the added value of high performance housing, giving the builder a powerful edge in building a high performance reputation.

Perhaps the most important reason to include building science in the building process is the reduced liability for building companies. With mold and moisture claims increasing, new practices like conditioned crawlspaces and spray-foam insulations, and the increased awareness of such issues and technologies by the general public, homeowners are demanding high performance homes. High performance building is the future of the housing industry. High performance development will be the next step. With the ever-increasing demand for green, efficient, healthy, comfortable homes, the opportunities for adding value to the development and the buildings themselves are endless. Those who take the first steps will be the industry leaders.

Planning for High Performance Building

Just as the construction methods of the actual building are beginning to make a difference in the way homes are marketed and valued, the way in which the land is prepared for the builder has a large effect as well. It would be easier to create a high performance building if the land was developed in such a way that the majority of the homes were sited for the implementation of passive-solar design. Also, much more green building would be accomplished if neighborhood guidelines required every home to be a "Zero Energy" home. Planners and developers have the ability to set the stage for the future of the housing industry, how homeowners interpret the value of housing, and how successful the builders will be in pushing for something new—something to differentiate themselves from their competition. This is something that planners and developer can easily facilitate, to the benefit of the builder and the perceived value of the development as a whole.

Resources

For more information on this topic, please contact the author at 828-350-1155 or www.HomeEnergyPartners.com.